

**APPARATUS, METHOD AND COMPUTER PROGRAM PRODUCT FOR  
CONTROLLING SCREEN BRIGHTNESS OF MOBILE TERMINAL**

**BACKGROUND OF THE INVENTION**

Field of the Invention

[0001] The present invention relates to a mobile terminal, and more particularly to an apparatus, method and computer program product for controlling the screen brightness of a mobile terminal.

Description of the Background Art

[0002] Recently, in line with the rapid development in mobile communication technology enabling image communications, an LCD (Liquid Crystal Display) is commonly used for mobile terminals and camera-attached mobile terminals are increasingly being used.

[0003] The LCD is advantageous in that text, pictures, animations or the like can be freely expressed and power consumption is low. However, a disadvantage with the LCD is that a display content can not be easily recognized in the dark. Due to such a disadvantage, LCD terminals use a backlight at a rear surface of the LCD.

[0004] In general, the backlight of the terminal is turned on according to a user's action such as when the user initiates or receives a phone call, presses a key or opens a folder. Then, the intensity of light (the intensity of illumination) emitted by the backlight is set to be suitable for the darkest situation around the terminal (or the user).

[0005] Further, the backlight used for the terminal is a device that consumes a relatively large amount of power. In the related art, the backlight is simply controlled to be turned on or off.

[0006] In addition, because the intensity of illumination of the backlight set for the terminal is designed to be suitable for night time or a dark room, it is inappropriate for most people that are active during the day or in areas with lighting. In addition, the battery usage time is reduced because of the large consumption of power.

### **SUMMARY OF THE INVENTION**

[0007] Accordingly, one object of the present invention is to solve the above-noted and other problems.

[0008] Another object of the present invention is to provide a novel apparatus, method and computer program product for controlling a screen brightness of a mobile terminal by which the intensity of illumination around a mobile terminal is measured and the screen brightness of the mobile terminal is controlled according to the measured value.

[0009] To achieve these objects in whole or in parts, the present invention provides a novel apparatus for controlling the screen brightness of a mobile terminal having a camera. The apparatus includes a controller which controls the mobile terminal to sense an illumination intensity around the mobile terminal and to determine a level of the illumination intensity, and a display unit which controls the screen brightness value of the mobile terminal based on the level of illumination intensity determined by the controller. The present invention also provides a novel method and computer program product for controlling the screen brightness of a mobile terminal.

[0010] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0011] The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0012] Figure 1 is a schematic block diagram of a screen brightness controlling apparatus in accordance with a preferred embodiment of the present invention;

[0013] Figure 2 is a flowchart of a screen brightness controlling method in accordance with the preferred embodiment of the present invention;

[0014] Figure 3 is a histogram showing a distribution of brightness values; and

[0015] Figure 4 illustrates an illumination intensity level table.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

[0016] A preferred embodiment of the present invention will now be described with reference to the accompanying drawings.

[0017] As shown in Figure 1, an apparatus for controlling the screen brightness of a mobile terminal includes a camera 10 for photographing an object and generating a corresponding image, and a display unit 40 for controlling a brightness of a backlight 30 according to a determined illumination intensity level. Also included is a controller 20 for controlling the camera 10 to sense an intensity of illumination around the terminal when a user operates the terminal and then to determine a level of the sensed intensity of illumination.

[0018] Further, the backlight 30 is a device for emitting light of different strengths according to inputted voltage values.

[0019] Next, Figure 2 is a flow chart of a screen brightness controlling method in accordance with a preferred embodiment of the present invention. An operation of the mobile terminal will be described as follows with reference to Figure 2.

[0020] When a user's action of the terminal (e.g., pressing a key, opening a folder, etc.) is sensed (step S10), the controller 20 controls the camera 10 to photograph an object (or a scene) captured by a lens of the camera 10 and then generates a corresponding digital image (step S20). The minimum unit of a digital image is a pixel, and each pixel has a brightness value (or brightness information).

[0021] Then, the controller 20 checks each brightness value of the pixels and produces a histogram for the number of pixels and brightness values. Next, the controller 20 determines the most frequently detected brightness value (hereinafter referred to as 'a brightness peak value') from the brightness values of pixels. Figure 3 illustrates an example of a histogram in which the horizontal axis indicates brightness values and the vertical axis indicates the number of pixels.

[0022] When the brightness peak value is found, the controller 20 reads a level of the intensity of illumination corresponding to the brightness peak value from an illumination intensity level table and transfers it to the display unit 40.

[0023] In addition, when the display unit 40 receives the illumination intensity level signal, the backlight 30 of the display unit 40 emits light having the intensity corresponding to a voltage value of the received signal (steps S40 and S50). The size of the illumination intensity level value is proportional to the intensity of the voltage value.

[0024] Once the user's manipulation is sensed, the terminal repeatedly performs the above described processes (steps S20~S50). As the processes (steps S20~S50) are repeatedly performed, the brightness of the display unit 40 is adaptively changed in accordance with a change in the surroundings illumination intensity. Further, when the user's manipulation is sensed, the controller 20 operates an internal timer. Also, the repetition time period of the processes (steps S20~S50) can be changed as desired by the user.

[0025] Thus, the controller 20 continuously controls the mobile terminal to sense the illumination intensity and to determine the level of illumination intensity, and the display unit 40 continuously controls the screen brightness value of the mobile terminal. If the predetermined time period has expired and a user then manipulates or uses the mobile terminal (YES in steps S60 and S70), the controller 20 again starts controlling the mobile terminal to sense the illumination intensity and to determine the level of illumination intensity, and the display unit 40 again starts controlling the screen brightness value of the mobile terminal.

[0026] However, if the timer expires (YES in step S60) and the user's manipulation is not sensed (NO in step S70), the process ends. If the time is not expired (NO in step S60), steps S20~S50 are repeated.

[0027] Next, Figure 4 illustrates in the illumination intensity level table in which ranges from a maximum brightness value to a minimum brightness value are divided into several brightness peak value sections and illumination intensity levels are defined corresponding to each brightness peak value section. Further, illumination intensity level is a control signal that can optimize illumination of the backlight 30 in a corresponding brightness peak value section.

[0028] As so far described, the apparatus and method for controlling the screen brightness of a mobile terminal have the following advantages.

[0029] That is, for example, as soon as the user's manipulation of the terminal is sensed, the screen brightness is automatically controlled for the user's convenience. In addition, because the screen brightness of the terminal is controlled according to the intensity of illumination around the terminal, the amount of power consumed for the backlight can be reduced.

[0030] In addition, the present invention includes a computer program product which is a storage medium including instructions which can be used to program a computer to

perform a process of the invention. The storage medium can include, but is not limited to, any type of disk including floppy disks, optical discs, CD-ROMs, and magneto-optical disks, ROMs, RAMs, EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions.

[0031] Further, this invention may be conveniently implemented using a conventional general purpose digital computer or microprocessor programmed according to the teachings of the present specification, as will be apparent to those skilled in the computer art. Appropriate software coding can readily be prepared by skilled programmers based on the teachings of the present disclosure, as will be apparent to those skilled in the software art. The invention may also be implemented by the preparation of application specific integrated circuits or by interconnecting an appropriate network of conventional component circuits, as will be readily apparent to those skilled in the art.

[0032] The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structure described herein as performing the recited function and not only structural equivalents but also equivalent structures.